

**A complete class notes
Of
Project Management
(BEG494MS)**

**B.E
Electronics & communication
VII Semester**



**Presented by:
www.oldquestions.net**

Syllabus:

PROJECT MANAGEMENT BEG494MS

Year: IV

Semester: I

Teaching Schedule Hour/week			Examination Scheme				
Theory	Tutorial	Practical	Internal Assessment		Final		Total
3	0	1	Theory	Practical*	Theory**	Practical	100
			20	-	80	-	

Course Objective: To provide students with fundamental principles and basic tools and methodology of initiating, planning, scheduling and controlling of the projects.

1. Introduction (3 hours)

- 1.1 Project definition.
- 1.2 Project Cycles, Project Phases.
- 1.3 Setting of Project Objectives and Goals.

2. Pre Project work: (2 hours)

- 2.1 Feasibility Study.
- 2.2 Project Appraisal.
- 2.3 Project Proposal.

3. Project Planning: (18 Hours)

- 3.1 Definition.
- 3.2 Planning Function.
- 3.3 Network models – CPM/PERT
- 3.4 Goal Oriented Project Planning (ZOPP planning)
- 3.5 Project Scheduling with limited resources.
- 3.6 Wiest's Algorithm.
- 3.7 Manpower leveling.
- 3.8 Materials scheduling.
- 3.9 Multi project scheduling
- 3.10 Mathematical programming for minimum cost or maximum project return.
- 3.11 Plan of operation and its different forms of presentation.

4. Project Monitoring and Evaluation (M&E) and Control.

(8 hours)

- 4.1 Definition of M&E.
- 4.2 Method and Technology in M&E.
- 4.3 Technique in formulating monitoring indicators.
- 4.4 Controlling systems.
- 4.5 Project control cycle.
- 4.6 Feedback control system.
- 4.7 Cost control
- 4.8 Work breakdown structure.
- 4.9 Project management information system.

5. Capital Planning and Budgeting (10 hours)

- 5.1 Capital Planning Procedure.
- 5.2 Operating and Capital budget.
- 5.3 Fixed and Flexible budge.
- 5.4 Revision of budget
- 5.5 Budget control method (Audit)

6. Impact Analysys

- 6.1 Social Impact Analysis.
- 6.2 Environmental Impact Analysis.
- 6.3 Economic Impact Analysis.

References:

- 1. Arnold M. Ruskin and W.Eugene Estes. “ Project Management”. Marcel Dekker Publishers. 1982.
- 2. Joseph J. Moder and Cecil R.Philips. “ Project Management with CPM and PERT”. Van Nostrand Reinhold Publishers. Latest edition.
- 3. LS. Srinath. “PERT and Application”. East-west press.
- 4. A. Bhattacharya and S.K Sorkhel. “ Management by Network Analysis”. The Institutions of Engineers. India.
- 5. Prasanna Chandra. “Projects: Preparation. Appraisal. Implementation”. Tata Mc Graw Hill Publishing Company Ltd. New Delhi.

Chapter- 1

PROJECT MANAGEMENT

I. Project Definition : (Projects are for development)

Key word or Phrase, used to define Project:

- a) One -time -only set activities
- b) Specific objectives
- c) Definite starting and ending point
- d) Life cycle
- e) Unique product or service as an output
- f) Specific group of beneficiaries
- g) Operates within the constraints of time, cost and quality performance

1. As per (Gittimager, 1985) :

A project is an investment activity in which financial resources are extended to create capital assets that produce benefits over extended period of time.

2. According to Project Management Institute of USA:

A project is a temporary end over undertaken to create a unique Product or Service.

3. According to Harold Kerzner :

A project is any series of activities or tasks that;

- i) have specific objectives to be completed within certain specifications
- ii) have defined start and end task
- iii) have funding limits
- iv) consume resources

4. According to S. Chaudhary:

A project starts from scratch with a definite mission, generates activities involving a variety of human and non-human resources all directed towards fulfillment of the mission and stops once the mission is fulfilled.

5. According to Trevor L. Young :

A Project is a collection of linked activities, carried out in an organized manner with a clearly defined start point and finish point to achieve some specific results, that satisfy the needs of an organization as derived from the current business plan.

Based on the above definitions of different writers we can define the project as below :

A project is an one-time-only set activities designed to attain:

- specific objectives within the constraints of time, cost and quality performance in dynamic environment
- through the planning use and control of a variety of resources
- To create a unique product or service within temporary life span

A project is an one-time-only set development activity which has

- Specific objectives
- Constraints of time, cost and quality performance
- Unique products or service as an output
- Life cycle (born and die)
- Specific group of beneficiaries

Types of Project:

Projects are of different types:

- a) Research and Development Projects
- b) Construction Projects i.e. Engineering Project
- c) Manufacturing of Aeroplanes, Vehicles etc.
- d) Software and website development Project
- e) Production of movies
- f) Advertisement Campaign
- g) Education and Awareness Campaign
- h) Training Programs
- i) Book Writing
- j) Course Manuals
- k) Developing new services etc.

Characteristics of the Project:

1. Specific Objectives:

Project must clearly define its objectives. Without objectives the Project can not be thought out.

2. Life Span:

Each Project has its own life span. As we said before, the Project is an one-time-only set activities. It has beginning and end. The life span of the Project depends upon the nature. Based on the nature of the Projects, some has long life span and some has short.

3. Constraints:

All Projects have constraints. Project operates within the constraints of time, cost, and quality performance.

- Project Schedule constraints time i.e. it sets deadline
- Project Budget sets cost limits
- Project Specification sets quality performance

4. Unique:

Each Project is different

5. Team Work:

Project is implemented through team members from different discipline and experiences. The Project Manager is the leader of the team.

6. Flexibility:

The Project operates in dynamic environment. And so it needs flexibility to response changing environment.

7. Resources Integration:

Integration of physical, financial, human and information resources is the must in Project. Project Manager is one who integrates these resources with minimum waste in the Project.

8. Planning and Control:

Project requires effective and efficient planning and control systems. Standards of the project activities are set through Planning. These standards are the yardsticks to measure project performance.

9. Contracting, Sub-Contracting

Most Projects are contract based.

10. Beneficiaries:

All projects have beneficiaries. Beneficiaries are those, who use the Project output.

Formulating Vision/ Mission/Goal:

Vision is the dream, an ideal end- result.

Mission is a means to attain the vision

Goals are means to attain the mission

Definition of Objectives:

Objectives are the desired outcomes or end result of the Project.

Objectives are the results to be achieved. They are the end result.

Goals: General statement of desired outcome, common to the whole system/ subsystem of an organization.

Objectives: Specific and goal-oriented may be different for various Projects of the organization.

Project goals and Objectives should be smart:

S- pecific

M-easurable

A-ttainable

R-ealistic/ esult – oriented / resource-based

T-ime - bounded

1. The overall goal of the Complex Development Project of Acme Engineering College is to provide minimum physical facilities required in teaching-learning process.
2. The objectives of the Complex Development Project of Acme Engineering College is to

i) Construct about 25,000 sq/ft floor area of main building , where required class rooms, laboratories, library and room for management will be managed.

ii) Construct Laboratory sheds of about 3000 sq/ft floor area

iii) Construct Basket ball court, Volley ball court etc.

Project Life Cycle:

We have already mentioned that the project has its own life. It has beginning and end points. It has fixed life span. The life span of the Project is divided into different phases.

Cleland divides the Project life cycle into following five different phases:

- i) *Conceptual* :Preliminary evaluation of Project Idea, identification of needs.
- ii) *Definitions* :Identification of the resources requirement and the establishment of time, cost, performance parameters
- iii) *Production* :standardization of efforts and completion of documentation, for operations; Project Implementation
- iv) *Operational*: Evaluation of the Project and its integration into another organization
- v) *Divestment* : Reallocation of resources to other Project

Most commonly, the following four phases are described in the life cycle of the Project.

- a) Formulation Phase
- b) Planning Phase
- c) Implementation Phase
- d) Termination Phase

1) **Project Formulation Phase:**

This is conception phase. The basic task in this phase consists of the following:

i) **Project Identification:**

Project are born with creative ideas. The creative ideas come from different situation :

- **Environment :** what is the political situation, socio cultural, economic, legal and technological forces in the respective environment are analysed.
- **Internal Resources of the Organization:** VMG of the organization, plan & strategy adopted by the organization and SWOT analysis etc. provide new Project idea.
- **External Resources:** Market demand, donors priority, legal provision, Competators' activities and vested interest of the politician provide Project idea.

ii) **Project Formulation:**

Two major activities are implemented during Project Formulation:

- a) **Statement of work:** Different parameters like scope & objectives of the project, role & responsibilities of project implementers; schedule, cost and quality of the Project etc are incorporated in statement of work.

- b) **Project Proposal:** Technical & Financial Proposal used for the bidding are the product of project proposal. Project proposal is an initial stage of project document which is formed after conducting prefeasibility study and preliminary design of the Project.

2) **Planning Phase (Project Development Phase) :**

Preparing of detailed plan, with, time, cost, and quality. The following are the three major activities, that are implemented during this phase:

→ **Feasibility study:**

Implemenatality of the Project is analysed in this study. The areas of analysis could be:

- i) Market analysis
- ii) Technical Analysis - Technically viable or not
- iii) Financial Analysis
- iv) Management Analysis
- v) Economic Analysis
- vi) Environment Analysis

→ **Appraisal:**

- Ability of the project to achieve its objectives.
- Comparability of the Project with other project in term of investment, cost/benefits , job creation profit etc.

Project Approval

- Finalization of funding proposals, agreement and contract document

- Allocation of the resources to the Project, introduction of appropriate rule & regulation for the Project

→ **Design:**

- Preparation of blue prints and specification
- Preparation of detail implementation plan

3) **Implementation Phase:**

→ Implementation → Mobilization

- Project organization is set
- Project team is formed and implementation is carried out through this team
- Project manager is the team leader and is responsible to mobilize the Project activities
- MIS is developed

→ Control:

CPM

PERT → Program Evaluation and Review Technique

4) **Termination Phase**

- Project Evaluation
- Project Handover

Project Environment:

Project Environment is classified into following three:

1. Internal Environment
2. Task Environment
3. External Environment

1. Internal Environment

1.1 Project Objectives

1.2 Constraints

1.3 Structure

1.4 Resources

2. Task Environment

It surrounds the Project and made up of different stakeholders. It does not control but influences the project

2.1 Customer

2.2 Contractors

2.3 Consultants

2.4 Suppliers

2.5 Government

2.6 Financiers

2.7 Competitors

2.8 Labour Union

3. External Environment

Elements of External Environment are **PEST**

Political-legal (P)

Economic (E)

Socio-cultural (S)

Technological (T)

3.1 Political-legal

a. Political Environment:

Political System

Political Institutions

Political Philosophies

b. Legal Environment:

Laws

Courts of Law

Law Administrators

3.2 Economic

- # **Economic System** (Free Market Economy, Centrally Planned and Mixed Economy)
- # **Economic Policies** (Monetary Policy, Fiscal Policy and Industrial Policy)
- # **Economic Condition** (Income, Business Cycle, Inflation and Stage of Economic Development)
- # **Regional Economic Groups** (SAARC, ASEAN, EU etc.

3.3 Socio- Cultural

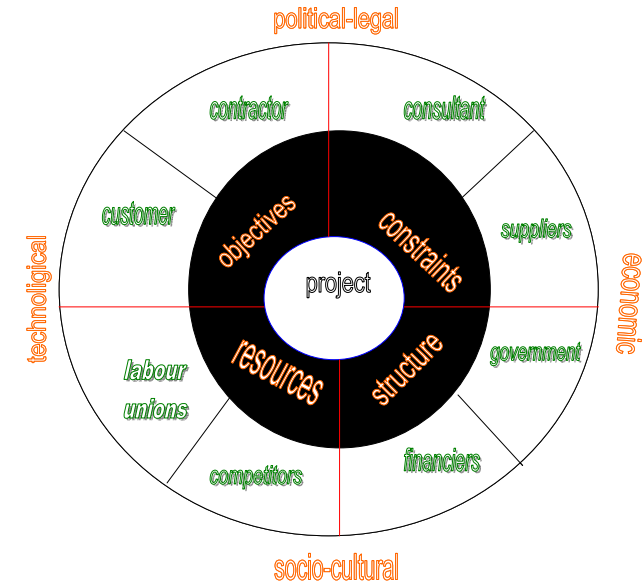
a. Social Environment:

- # **Demographics** (Size, Distribution and Growth of Population, Age Mix of Population, Migration)
- # **Social Institutions** (Reference Groups, Social Class)
- # **Pressure Groups** (Political parties, Human Rights and Women Rights Group)
- # **Social Change**

b. Cultural Environment

3.4 Technological

- # **Level of Technology** (Labour-Based or Capital Based Technology)
- # **Pace of Technological Change**
- # **Technology Transfer** (Globalization, Turn key Projects, Trade, Technical Assistance, Training)
- # **Research and Development Budget**



Chapter: 2

Feasibility Study

Feasibility Study is the process of determining the project's implementability. It asks the following questions:

- # Will it work? Can it be improved?
- # Is there a better way? Is it worthy?

The feasibility study covers the following:

- a. Technical Analysis
- b. Economic Analysis
- c. Marketing Analysis
- d. Management Analysis
- e. Env. Analysis

a. Technical Analysis

Technical Analysis covers the following:

- # Choice of available technologies
- # Design Requirements
- # Human Resource Requirement
- # Size, Location and Geology
- # Technical Risk

b. Economic Analysis

It studies the economic viability of the project.

- * **Cost-Benefit Analysis (CBA) is used to assess the overall impact of the project**
- # For a privately owned project CBA examines profitability, i.e., project's ability to earn profit.
- # For publicly owned project, CBA analyses social profitability in terms of contribution to the national economy : Poverty Reduction, Employment Generation, Social Development and Economic Growth.
- # The project with the best CBA is feasible project.
- # The following techniques are used to calculate cost benefits:
 - * Cost Benefit Ratio
 - * Net Present Value
 - * Internal Rate of Return

c. Marketing Analysis

It studies the marketing viability of the project, the areas of focus of which are:

- # Availability of Raw materials

- # Market Demand (National and International)
- # Sales Forecast and Estimated Revenue
- # Marketing Program (Price, Distribution etc.)
- # Market Coverage of the Project
- # Quality Specifications
- # Competitive Factors, (Existing Competitors)

It is very important aspects of the Feasibility Study. The most of the project in developing countries fail due to marketing problems.

d. Management Analysis

It studies the institutional viability I.e. the capacity of the organization to direct and control the project.

The areas of the focus in this analysis are:

- # Institutional Relationship
- # Project Organization
- # Project Management
- # Stakeholders Analysis

e. Environmental Analysis

It studies the impact of the project in environment. The focus areas of this analysis are:

- # Environmental Suitability (The capacity of the environment to support the project).
- # Environmental Impact (The impact of the project activities in the environment like pollution, soil erosion, damage to flora and fauna).

Each government has its own guideline for Environment Impact Assessment(EIA), which covers the following:

- i) Ecological: Impact in flora and fauna
- ii) Physical: Impact on quality of air, water

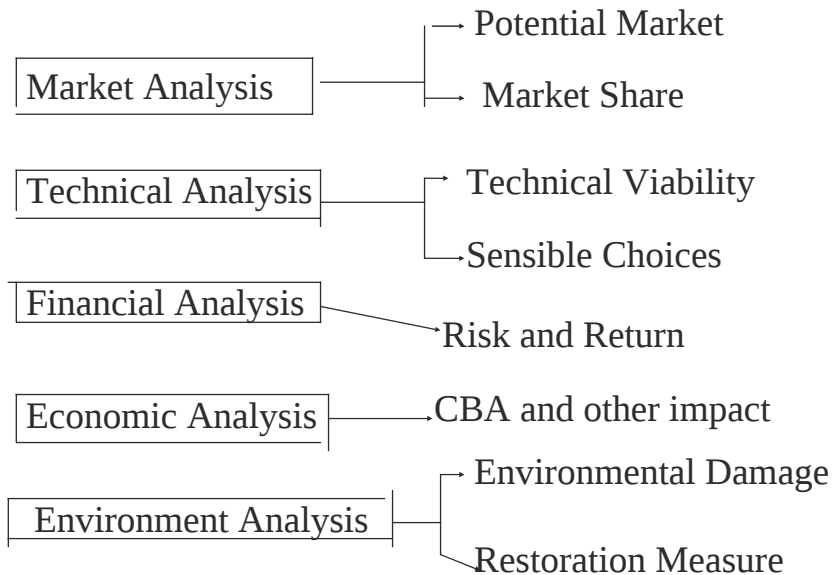
- iii) Aesthetic: Impact in beauty
- iv) Social: Impact in society. For this SIA is done.
- v) Ecological Relationship: impact on food chain

f. Financial Analysis

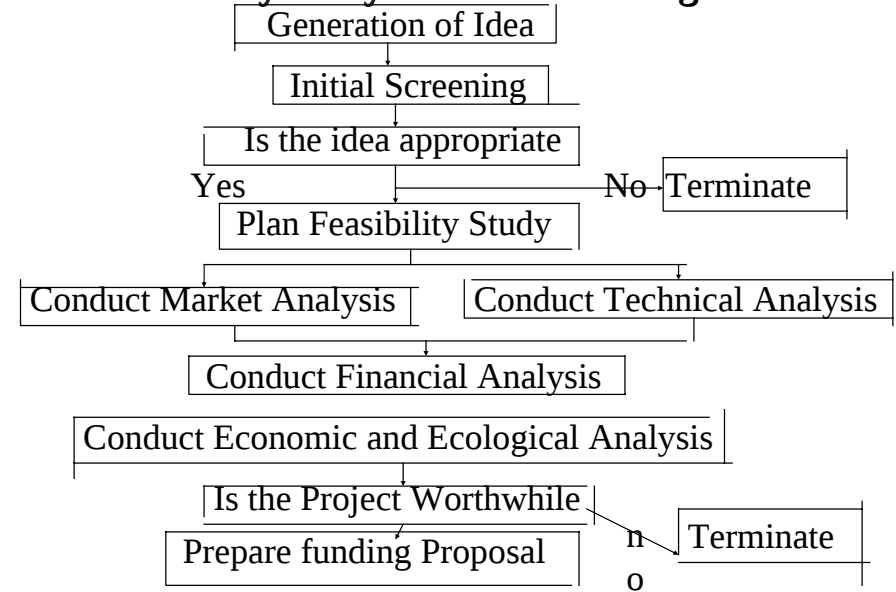
It studies the financial sustainability of the project. The area of focus are:

- i) Capital Requirement
- ii) Sources of fund
- iii) Projected Cash Flow
- iv) Accounting and Reporting System
- vi) Project Profitability

Key Issue in Feasibility Study



Feasibility Study: A schematic Diagram



Project Appraisal

It is evaluation of project's ability to succeed. It is based on the findings of the feasibility analysis. It addresses;

- * Ability of the project to achieve its objective.
 - * Comparability of the project with other projects in term of investment, cost-benefit, job creation, profit etc.
- Donors generally send mission for project Appraisal.

Appraisal should be done systematically to provide an overall assessment of the project's likelihood for success. It answers the following questions;

- Will the project as designed meet its objective?
- The primary function of appraisal is to evaluate a project's ability to achieve its objectives. For private project, the objective might be profitability where as for public project it might be socio-economic development.

Project Proposal

The set of documents submitted showing how the target will be met is called project proposal. It is blueprint of project activities. It describes organization's capacity to carry out project work. It also indicates the cost of the project. Generally, it deals with two parts;

- * Technical
- * Financial

Procedure for developing Project Proposal

- Project brief--- need, objective, benefit
- Feasibility study
- Preliminary design
- Proposal development

The Project proposal should contain following informations;

- Project objective
- Project activities
- Execution process
- Project Schedule

- Project budget
- Monitoring & Evaluation process

Chapter: 3

Project planning:

Planning: Planning is thinking ahead. Planning is a management activity and a continuous process, where the following analysis is carried out:

1. Where are we now?
2. Where to go?
3. What goals and objectives are to be set?
4. How to select best method?
5. What is to be done?
6. When it is to be done?
7. People Responsible!
8. How it is to be done?
9. Identifying resources and persons to be consulted.

“Planning is deciding in advance about what to do, How to do it, when to do it and who is to do it. It provides the ends to be achieved.”

-Stephen P. Robbins

“Planning is the process by which managers define goals and take necessary steps to ensure that these goals are achieved”.

-Richard Steers

Steps in Planning Process

1. SWOT Analysis

2. Set Goals
3. Develop premises
4. Determine and evaluate alternatives.
5. Select course of Action
6. Formulate Action Plan
7. Prepare Budget

Elements of Planning

- Vision.
- Mission.
- Goals.
- Objectives
- Strategies.
- Monitoring.
- Measuring.
- Analysis.
- Re-planning.

Planning Skills:

A. Task Related Skills

- **Prioritizing**
- Setting objectives and targets
- Time management
- Scheduling
- Developing contingencies plans
- Analyzing
- Synthesizing
- Decision making

B. People Related Skills

- Communication
- Involving
- Supporting
- Gaining commitment
- Delegating
- Listening

Project Planning is deciding in advance about:

- * What are the activities to be done?
- * How these activities will be done?
- * When these activities will be done?
- * Who will do these activities?

“Project Planning is the process of thinking through and making explicit the project’s objectives, goals and strategy necessary to bring the project through its life cycle to successful termination”.

- David I. Cleland

Purpose of the Project Planning

1. Control risks and uncertainty in the project environment
2. Allocate resources in coordinated manner.
3. Establish performance standard.
4. Provide procedure of project execution
5. Establish system of correction
6. Ensure the project completion in time within the allocated budget and as per quality performance.
7. Improve efficiency and minimize waste

Project Planning Process

It consists of the following steps:

1. Understand the project objective
2. Identify key project stages
3. Prepare Work break down Structure
4. Determine logical sequence of the activities
5. Estimate time and resource requirements.
6. Allocate responsibility for each activity
7. Finalize project plan

Remember:

- KEEP CONFIDENCE
- TRUST OTHERS
- NEVER LOOSE HOPE

Planning Function:

1. Introduction:

One of the most important responsibility of the project manager is planning. Almost all projects require formal and detailed planning.

Planning function involves the selection of the objectives and establishing the policies, procedures and program necessary to achieve them.

The project planning must be systematic, flexible, disciplined and capable to accept multifunctional inputs.

One of the objectives of project planning is to identify all works to make aware to all project participants.

There are four basic reasons for project planning:

- * To eliminate or reduce uncertainty.
- * To improve efficiency of the operation.

* To obtain better understanding of the objectives.

* To provide a basis for monitoring and controlling work.

2. Nine major components of Planning

- i. Objectives setting.
- ii. Strategy to be followed.
- iii. Scheduling.
- iv. Budgeting.
- v. Forecast.
- vi. Organization.
- vii. Policy
- viii. Procedure
- ix. Standard.

3. Project Graphics

The project plan should be reflected in the paper in such a way that every one can easily understand. Graphics are the easiest means for communicating information.

Planning is also the means of control and basic control parameters in the project are time, cost and performance, the graphical presentation of the planning should incorporate all these parameters and their relationship.

Graphical displays of the planning are the prime means of tracking cost, schedule and performance. `Proper graphical display can result in:

- * Cutting project cost and reducing time scale.
- * Coordinating Planning
- * Eliminating idle time

- * Obtaining better scheduling and control of contractor activities
- * Developing better troubleshooting procedure.
- * Cutting time for routine decisions, but allowing more time for decision making.

Bar (Gantt) Chart

- # In early 1900s Henry Gantt first utilized it.
- # It is the most common type of display.
- # It is a means of displaying simple activities and events plotted against time or cost.
- # Bar chart are used to exhibit program progress and specific work required to accomplish to get objectives. Bar Charts often include the following:
 - * Listing of activities
 - * Duration of activity
 - * Schedule dates
 - * Progress – to – date

Types of Bar Chart

- i. Bar Chart for single Activities
- ii. Grouped Bar Chart for performance Comparison
- iii. Direct and Indirect Materials and Labour cost break down for all Programs per year
- iv. Quantitative Pictorial Bar Chart.

Network Models CPM/PERT

1. Introduction:

- # Network models are the control techniques of the project.

- # PERT and CPM are the network models used for planning, scheduling and control of the project.
- # PERT and CPM were originally developed in 1958/59 to meet the needs of “Age of Massive Engineers” where traditional method like Gantt charts were inapplicable.

2. Historical background of PERT/CPM

- # PERT was created as a means to plan and accelerate the development of “polaris Ballistic Missiles”.
- # The special project office of US Navy has introduced PERT to plan the missile development as quick as possible.
- # PERT as a planning, scheduling and control technique came into existence to answer the following questions.
 - a) What research has to be done to accomplish the missile development and how should it be planned?
 - b) How long would the research take place?
 - c) What stages of the development and testing would be necessary for the missiles completion?
 - d) How fast could the country do it?
 - e) In summary, when could the United States expect to have an operational polaris missile?

3. Planning scheduling and control:

- # planning involves listing of tasks or jobs to be performed; materials, equipments and manpower requirements are analyzed and estimate of costs and duration for different jobs are made.
- # Scheduling is the laying out of the actual jobs of the project in time order in which they have to be performed.

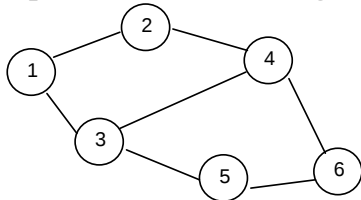
- # Control is the managerial function, which reviews the difference between schedule and actual performance.

4. Basic Concept of PERT and CPM:

- a) *Events* : It is starting or ending point for a group of activities. The circles represent Events.
- b) *Activity*: It is the work required to proceed from one event or point to in time to another. Arrow represent activities.
- c) *Predecessors*: It is an activity which is required to finish to start next
- d) *Successor*: It is an activity, which can be started only after the completion of previous activity.
- e) *Dummy Activity*: It is an activity which does not consume time or resources.
- f) *Critical Path*: It is longest path or sequence of connected activities. Its length determines the duration of the project.

5. Steps in PERT:

- a) Identifying of different activities including dummy activities needed to complete the project.
- b) Identification of the sequence of the activities implementation through diagram.



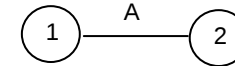
- c) Finalize the time requirement to accomplish each activity. Generally two time estimate (EST and LST) is prepared.
- d) Connect all activities in sequential order to form a network.

6. PERT provides answer to the following:

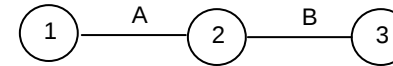
- a) Finish time of the project.
- b) Start and finish time of the each individual activity of the project.
- c) Activities that needed to be done first before starting others.
- d) Possibilities of shifting resources from non-critical activities to critical activities.
- e) Activities that need concentration of management effort at one time.
- f) Uncertainty reduction in a project.

7. PERT Conventions:

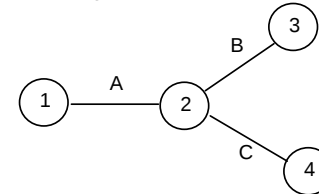
- a) Two events connected by one activity .



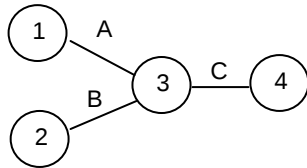
- b) Activity A must be completed to start B.



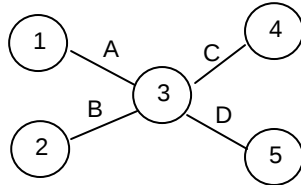
- c) Activity A must be completed before to start B and C.



- d) Activity C can not be stated until both A and B are completed.



e) C and D can not be started until both A and B are completed.



Objective of Network models:

The main objectives of network models are to

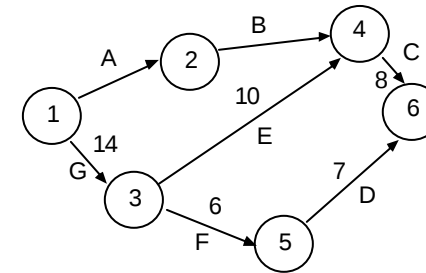
- Define the activities to be done in the project.
- Integrate the activities in a logical time sequence.
- Dynamic control over the progress of the project plan.

PERT: Programme Evaluation and Review Technique

- # The *Program Evaluation and Review Technique* (PERT) is a network model that allows for randomness in activity completion times.
- # PERT was developed in the late 1950's for the U.S. Navy's Polaris project having thousands of contractors. It has the potential to reduce both the time and cost required to complete a project.
- # PERT originally was an *activity on arc* network, in which the activities are represented on the lines. Over time, some people began to use PERT as an *activity on node*

network. For this discussion, we will use the original form of activity on arc.

The following is a very simple example of a PERT diagram:



Steps in the PERT Planning Process

- Identify the specific activities.
- Determine the proper sequence of the activities.
- Construct a network diagram.
- Estimate the time required for each activity.
- Determine the critical path.
- Update the PERT chart as the project progresses

Benefits of PERT

PERT is useful because it provides the following information:

- Expected project completion time.
- Probability of completion before a specified date.
- The critical path activities that directly impact the completion time.
- The activities that have slack time and that can lend resources to critical path activities.
- Activity start and end dates.

PERT Limitations

The following are some of PERT's weaknesses:

- The activity time estimates are somewhat subjective and depend on judgment. In cases where there is little experience in performing an activity, the numbers may be only a guess. In other cases, if the person or group performing the activity estimates the time there may be bias in the estimate.
- Even if the activity times are well-estimated, PERT assumes a beta distribution for these time estimates, but the actual distribution may be different.
- Even if the beta distribution assumption holds, PERT assumes that the probability distribution of the project completion time is the same as that of the critical path. Because other paths can become the critical path if their associated activities are delayed, PERT consistently underestimates the expected project completion time.
- The underestimation of the project completion time due to alternate paths becoming critical is perhaps the most serious of these issues. To overcome this limitation, Monte Carlo simulations can be performed on the network to eliminate this optimistic bias in the expected project completion time.

CPM:Critical Path Method

In 1957, DuPont developed a project management method designed to address the challenge of shutting down chemical plants for maintenance and then restarting the plants once the maintenance had been completed. Given the complexity of the process, they developed the Critical Path Method (CPM) for managing such projects.

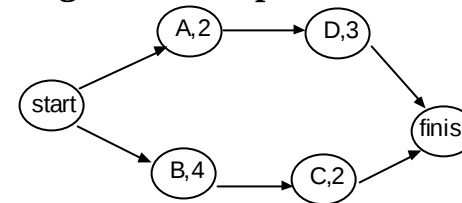
Benefit of CPM

CPM provides the following benefits:

- Provides a graphical view of the project.
- Predicts the time required to complete the project.
- Shows which activities are critical to maintaining the schedule and which are not.

CPM models the activities and events of a project as a network. Activities are depicted as nodes on the network and events that signify the beginning or ending of activities are depicted as arcs or lines between the nodes.

The following is an example of a CPM network diagram:



Steps in CPM Project Planning

- Specify the individual activities.
- Determine the sequence of those activities.
- Draw a network diagram.
- Estimate the completion time for each activity.
- Identify the critical path (longest path through the network)
- Update the CPM diagram as the project progresses

CPM Limitations:

CPM was developed for complex but fairly routine projects with minimal uncertainty in the project completion times. For less routine projects there is more uncertainty in the completion times, and this uncertainty limits the usefulness of the deterministic CPM model. An alternative to CPM is the PERT project planning model, which allows a range of durations to be specified for each activity.

The major symbols used CPM are:

EST or ES = Early Start Time or Early Start

EFT or EF = Early Finish Time or Early Finish

LST or LS = Late Start Time or Late Start

LFT or LF = Late Finish Time or Late Finish

ST = Start Time

FT = Finish Time

EET = Early Event Time

LET = Late Event Time

i = Starting or preceding event

J = Finishing or succeeding event

FF or FS = Free Float or Free Slack

TF or TS = Total Float or Total Slack

T/t = Duration/ Time

Float is a time available for delaying any activity not changing the total project duration.

Free Float (FF) is the time of flexibility available which if used will not delay the early start of the succeeding activity.

Total Float (TF) is the total flexibility available in scheduling.

Conditions of Criticality:

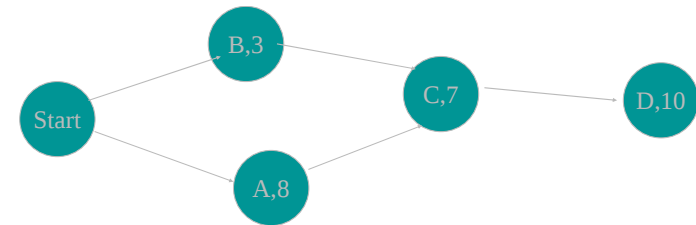
1. The early start time and late start time must be same.

2. The early and late finish time must be the same
3. The difference between EST and LFT must be equal to the duration of the activity

Types of Project Network

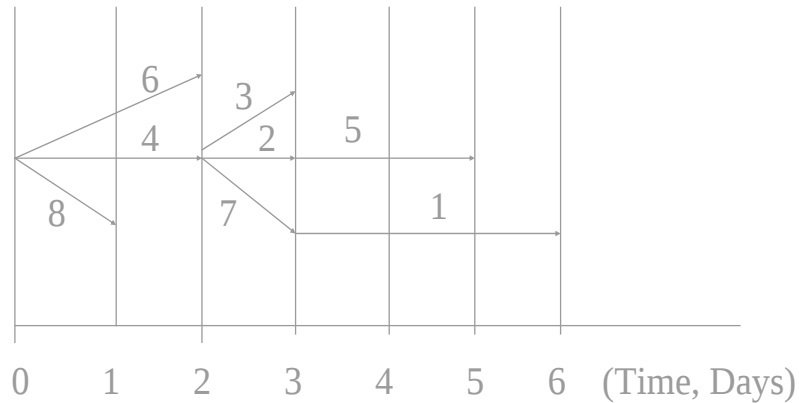
There are two types of Project Network:

1. The Activity on Arrow (AOA)
2. The Activity on Node (AON)



Project Scheduling with Limited Resources:

- * Until now we have assumed that the constraint is scheduling an activity, i.e., start and finish date.
- * In this case the assumption is that the resources are available in unlimited supply.
- * But in practice, the availability of the resources is limited, like limited manpower or budget or equipments.
- * Jobs that occur in parallel paths in a network may demand the same limited resources. This situation force to reschedule.
- * Consider a project below plotted as a schedule graph with a horizontal time scale:



are a very large number of combinations of activity start time.

- * Only a computer program will help the Project Manager in scheduling the project activities.

Chapter- 4

Monitoring and evaluation:

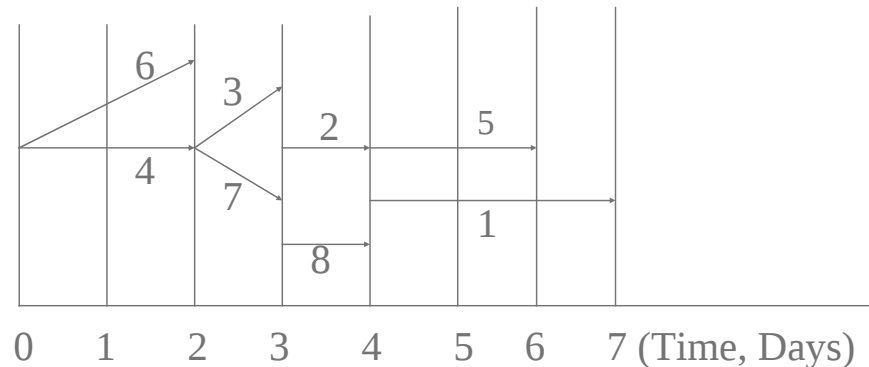
Definition:

Monitoring and Evaluation are essential tools, which helps to improve the efficiency of on –going projects and the selection and design of future projects. It also helps the project team to make a rational and improve decision about the project performance. It is must for achieving the objective of the project.

Monitoring is an initial project activity designed to provide constant feedback on the progress of the project, the problem it is facing, and the efficiency with which it is being implemented. In other words it is the gathering of information to review and analysis project implementation. So the monitoring is an ongoing and continuous activity throughout the entire life of the project. The project, which does not have effective monitoring system, the cost of the project will not be sufficient, targeted time of the project completion will be increased and the quality of the output will not as per the target.

David I. Cleland defines “Monitoring means to keep track of and to check systematically all project activities”.

Suppose there are only 10 men available in one day.



Complexity of Project Scheduling with Limited Resources

- * We see in the example that there is only one resource limitation. But in practice, there may be more resource limitation.
- * In such situation, it will be very difficult task for Project manager to schedule the project activities, as there

According to Meredith and Mantel, “Monitoring is collecting, recording and reporting information concerning any and all aspects of project performance that the project manager or other or others in the organization wish to know”.

Evaluation , on the other hand, is mainly used to help in the selection and design of future projects. Evaluation study helps to know whether the project could produce or not the intended impacts and the project was cost-effective or not. Evaluation, therefore is assessment of whether or not the planned project strategy actually works in the field. Evaluation should not be done to prove that the project is successful or to prove that it is a failure. It should be conducted to improve the strategies and techniques for the future projects.

Evaluation is an objective and systematic judgment process for determining relevance, efficiency, effectiveness and impact of project performance. It is an external activity in the project. Project evaluation is done during different phases of the project. David I. Cleland divides project evaluation on the following four major types:-

1) Per Project Evaluation:

It is done to select project to determine if it fits the objectives and overall strategy of the organization.

2) Ongoing project Evaluation:

It is conducted to measure to the status of a project during its operation.

3) Project complementation Evaluation:

It is carried out for an immediate assessment of the success upon project completion

4) Post project Evaluation:

It is undertaken to find out the impact of project in society in long term basis.

Method and technique of M&E:

There are several methods and technique of Monitoring and Evaluation. Previously, conventional method of M&E was used, where external experts, based on predetermined indicators to measure input and output, carried out M&E . The major purpose of this methods is to ensure accountability of the project staff.

Participatory method and M&E is widely used now a day. In this method all the project stakeholders collaboratively involve in the M&E process. This method is action-oriented and cyclic in nature.

Different donor agencies of the world are providing funds to the developing and under developed countries for different projects. They have developed their own system of M&E. The following given are the example of the M&E technique adopted by some donor agencies of the world.

i) The World Bank:

The world Bank was established to grand long-term loan to the member countries for the development activities. The function of the world Bank include Development and Reconstruction of the member countries, promotion of the private foreign investment, raise productivity and standard of living. The performance standards of the WB funded project are included in the project appraisal report and loan document. It includes the indicators like development

objectives, inputs and components of the project, outputs to be achieved, project impact, assumption and risks etc. They are stated in the form of policy action matrix or logical frame work.

Formal monitoring of the project is done on the basis of trimester progress report and financial statement provided by the project management information system. The local office of the WB also monitors the project as and when needed basis. Information Monitoring is also regularly carried out through telephone, e-mail and fax.

Project Evaluation is done through external consultants supported by the WB staff. This evaluation team, commonly known as, WB mission evaluates the project in every six months or annually, develops Aide Memoir and provides to the project management. All the corrective actions to be taken by the project team as well as the future activities to be implemented by the project are included in Aide Memoir.

The World Bank has introduced **Loan Administrative Change Initiative (LACI)** in July 1998. The major objective of this LACI is to ensure sound financial management in project. This system is being implemented in new projects. This system was established to monitor the effectively manage loan.

ii) **The Asian Development Bank:**

The ADB was established in 1996 with an aim to foster economic development of Asian countries and Far East. It has also the aim to promote investment of both public and private capital for the development purpose, to provide technical and credit assistance to member countries.

The formal monitoring system is based on Project Management Information System(PMIS). The PMIS generates periodic reports, accounting statement and statistical analysis on regularly interval. The appraisal report and loan agreement serves as a base for monitoring. An informal monitoring is also carried out through telephone and e-mail.

For the **evaluation** of the project, the appraisal report and loan agreement report serves as the base. The ADB uses various types of evaluation of the project in different time. They are:

- Appraisal
- On-going Evaluation.
- Project Completion Evaluation.
- Benefit Monitoring Evaluation.

iii) **INGOS:**

INGOS are the non-governmental organizations. They are established to support the developing countries. Their basic focus is on:

- Community Development Activities.
- Income Generating Activities.
- Advocacy Activities.

Formal Monitoring is done through periodic process reports and accounting statement. They compare the actual findings with previously set performance standards in terms of time, cost and quality and corrective action taken accordingly. Informal Monitoring is done through telephone or e-mail.

Evaluation is done on continuous basis. INGO staff makes a regular visit to the project site and evaluate the project progress. Based on the policy of the organization, the visit could be in weekly or monthly basis. **Impact Evaluation** is also done for the country program.

Project Control

- * The control is an essential function of management
- * The control is a process of monitoring, evaluation and comparing planned results with actual results to determine the status of the project cost, schedule and performance standard.

As per David I Cleland “Control is a fact finding and remedial action process to facilitate meeting the project objectives and goals, its primary purpose is not to determine what has happened, but rather to predict what may happen in the future if present conditions continue and if there are no change in the management of the project”.

According to Koontz and Weihrich, “The controlling is the measurement and correction of performance in order to make sure that enterprise objectives and the plans devised to attain them are accomplished”.

As per Ivancevich, Donnelly, Wilson, Controlling consists of actions and decisions managers undertake to ensure that actual results are consistent with desire results. Hence the control is a managerial function and continuous process. Control measures actual performance and compare it with standards to identify deviations. Planning provides standard for control. Deviations are identified in order to take corrective actions.

Types of Control:

1. Concurrent Control:

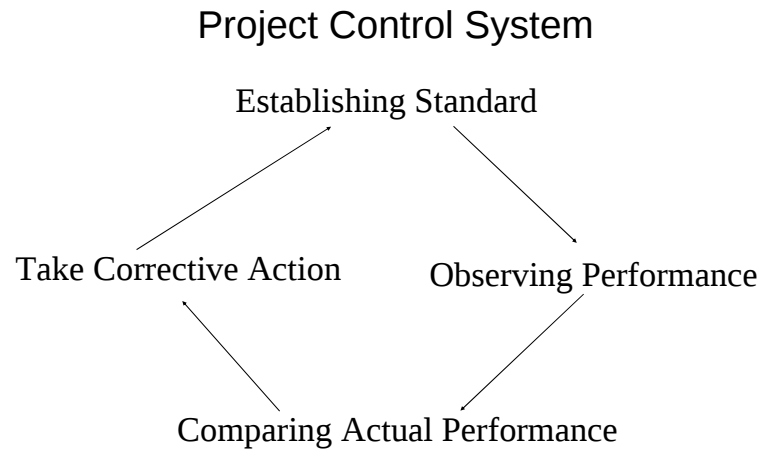
It is also known as Yes/no control. It is process based. It occurs while an activity is still taking place.

2. Pre-control:

It is also known as predictive or preventive control. It is input based control. It attempts to anticipate deviation in advance and allows corrective action to be in advance of the problem.

3. Feedback Control:

It is called historical or post control. It is output based control. Results are measured after the completion of the project.



- i) How the project is doing?
- ii) What is the cause of deviation if it exists?

Corrective Action:

It could be in the form of re-planning, re-programming, re-allocating resources or changing the organization and management.

It usually focuses on cost, schedule and quality performance of different parameters of the project.

Establishing Performance Standard

Key standards in project control include:

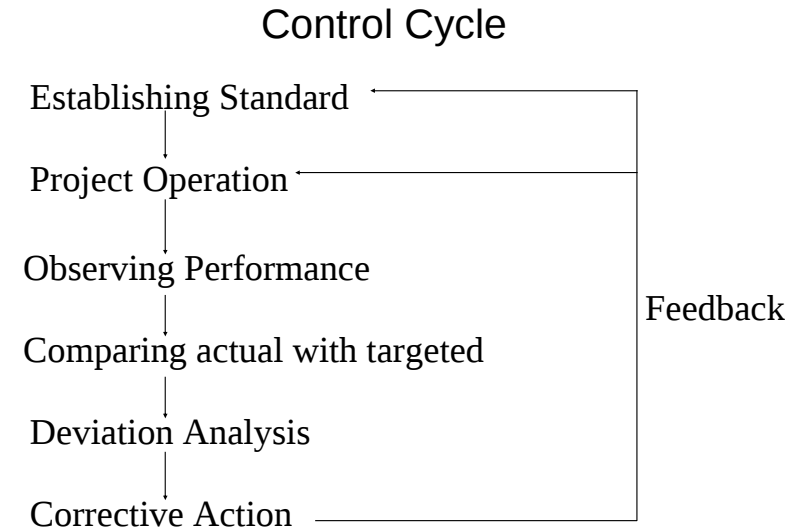
- | | |
|---|------------------|
| 1. Scope of Work. | 2. Specification |
| 3. WBS | 4. Work Package |
| 5. Cost Estimate & Budget | |
| 6. Master and supporting Schedule | |
| 7. Financial Forecast and funding plans | |
| 8. Quality | 9. Reliability |
| 10. Productivity | |
| 11. Physical Quantity of work | |

Performance Observation:

It is receiving sufficient information about the project to make comparison of planned and actual performance. It can be obtained through formal and informal sources.

Comparing Actual and Planned Performance:

It answers two key questions



FEED BACK CONTROL SYSTEM:

Feed back control system mainly focuses on the data obtained from project implementation and does not use available historical data. This system is used to show difference between actual progress & planned targets & resources used against estimated quantities or budgets.

In Feed back control system data from implementation field is obtained to compare;

- # Schedule start VS Actual Start
- # budgeted cost Vs Actual cost
- # Estimated Quantity Vs Actual Quantity
- # Scheduled Time Vs Actual Time
- # budgeted manpower Vs Actual manpower
- # budgeted unit cost Vs Actual unit cost

This system always gives information after something already happen. This is why this system may not be suitable for controlling for controlling the activities of on going projects but Feed back from a project may be used as historical data for planning & controlling other projects.

COST CONTROL:

Cost control is basically achieved by decision making process. Any delay in decision making incurs more cost and hence project becomes more expensive. Therefore prompt decision making is one of the best criteria for cost control.

Elements of Cost control:

The following are the various elements which play vital role for overall cost control of a project.

- 1) Observation: Regular observation should be made on
 - material consumed
 - manpower consumed
 - equipment employed
 - other direct cost
- 2) Comparison: Comparison shows deviation between observed data & design standard.
- 3) Identification for reasons for deviation: For identifying reasons for deviations, it is essential to check
 - the purchase price of material
 - quality of material
 - quantity of wastage
 - efficiency of equipments
- 4) Take Corrective action: If the deviation is beyond the tolerable limit then it will be essential to take corrective action.

WORK BREAKDOWN STRUCTURE:(WBS)

WBS groups project activities in hierarchical order for each stage of project. The project work is broken down into smaller elements which will be manageable & measurable.

According to Goodman & Love,

“WBS is a systematic & disciplined approach for breaking down a project into its many components”

- WBS lists all the activities needed to complete the project in a hierarchical order.
- WBS breaks down project activities in small elements.
- WBS presents inter-relationship of activities.
- WBS establishes cost & budgets.

PROJECT MANAGEMENT INFORMATION SYSTEM: (PMIS)

A Project operates in a dynamic environment. The project manager needs timely and accurate information to respond to environmental change. Information is life of a project. It is pre-requisite of project control.

PMIS is anyway of collection of data that will help the manager to perform his job efficiently & effectively. PMIS is formalized & structured activity of individuals, machines and methods for providing information to managers on a regular basis to assist in planning, allocating resources, controlling activities and making decisions. The essence of PMIS is the collection of actual data, grouping the data for specific purpose, analyze the grouped data and use the data to prepare report to indicate organizational performance.

Elements of PMIS:

Input: It consists of data generated by various projects.

Transformation: It is the process of storage & retrieval of information.

Output: It is the performance of project.

Feed back: It provides information to redesign input activities.

Chapter- 5

Capital Planning and Budgeting

1. Nature of Investment Decision:

The Investment Decision of an organization is generally known as the Capital Budgeting or Capital Expenditure decisions. A capital budgeting decision may be defined as the organization ' decision to invest its current fund(budget) in long term assets in anticipation of an expected flow of benefits over a series of years.

The firm's investment decision would generally include establishment expansion, acquisition, modernization, and replacement of long- term assets. Advertisement campaign, and Research & Development activities have also long- term implication for the form's benefits and so, they are also be taken

as investment decision. Thus the following are the feature of Investment decision or Capital Budgeting:

- a) The exchange of current fund for future benefits
- b) The funds are invested in long term assets
- c) The future benefit will occur to the firm over the series of years

The expenditure and benefits should be measured in cash. In the investment analysis it is cash flow rather than accounting profit.

2. Importance of Investment Decision:

Due to the following reasons, Investment decision requires special attention:

- They influence the firm's growth in the long run
- They affect the risk of the firm
- They involve commitment of large amount of fund
- They are irreversible or reversible at substantial loss
- They are among the most difficult decision to make

3. Type of Capital Investment:

The Capital Budgeting can be classified in different ways: The simple way of classification is:

- a) Physical assets
 - b) Monetary
 - c) intangible
- a) Physical assets are tangible such as : Land, building, vehicle, lab equipments, furniture, office equipment
 - b) Monetary assets are financial claims against some parties, Like Deposits (TU & CTEVT). Equity shares are the examples of monetary assets.
 - c) Intangible assets are investment in R&D activities, training, advertisement etc, which in long run generate benefit to the organization.

Similarly it can be classified as below:

- a) **Mandatory Investment:** Basic statutory equipments required to run the firm or organization,
- b) **Replacement Investment :** Replacement of old equipment by new with an aim to reduce operating cos
- c) **Expansion Investment :** It is to increase the capacity to cater to a growing demand.
- d) **R&D Investment :** It is to develop new products and process as well as market demand.
- e) **Miscellaneous :** Interior decoration, landscaped , gardens etc.

4. Phases of Capital Budgeting

- a) *Planning :* broad investment strategy and preliminary screening of project proposals
- b) *Analysis :* If project seems to be preliminary feasible than marketing, technical, economic and ecological analysis is carried out.

5. Selection (Investment Evaluation Criteria) :

Selection follows and often overlaps analysis. A wide round Appraisal Criteria have been suggested to judge the worthfullness of a project. They are divided into two board areas:

i) Non-discounting Criteria:

- * Pay-Back Period (PBP): Which should be less than target period.

- * Accounting rate of return (ARR): Which should be greater than target rate.

ii) Discounting Criteria:

- * Net Present Value (NPV): Which should be greater than zero(o).
- * Internal Rate of Return (IRR): Which should be greater than the cost of capital.
- * Benefit Cost Ratio (BCR)

6. Financing : Once the project is selected, financing arrangement has to be done. Two major source of financing are equity and dept.

- Equity:** Shareholders fund, or retained earnings.
- Debt:** Loan funds

7. Implementation

8. Review

Investment Criteria Technique of CB (Capital Budgeting)

The main aim of Investment Criteria is to facilitate an easier understanding of costs & benefits, risk analysis and cost of capital. More than 30 criteria have been proposed, but the most popular and important Investment Criteria are classified into two major categories they are:

I. Discounting Criteria

- Net Present Value (NPV)

- Benefit cost ratio (BCR)
- Internal Rate of Return (IRR)

II. Non-discounting Criteria

- Payback Period (PP)
- Accounting Rate of Return (RR)

$$1. \quad \text{NPV of a Project} = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - \text{Initial Investment}$$

Where: C_t - Cash flow at the end of t year

n - Life of Project

r - discount rate/ the cost of capital

or rate of return, which is assumed in the beginning of the project based on the risk of Project

Example : The initial Investment of the Project is 1,800,000/-. Cash flow for 5 yrs period are 400,000/-; 450,000/-; 500,000/-; 550,000/-; 600,000/- and cost of capital is 10% ; Calculate NPV;

$$\text{NPV} = \frac{400000}{(1+0.1)^1} + \frac{450000}{(1.1)^2} + \frac{500000}{(1.1)^3} + \frac{550000}{(1.1)^4} + \frac{600000}{(1.1)^5} - 1,800,000/-$$

$$= 363636.36 + 371900.02 + 375657.4 + 372555.1$$

$$= 21859407/- - 18000000/- = 59407 > 0. \text{ So accepted.}$$

The NPV represents the net benefit over and above compensation for time & risk.

2. Benefit Cost Ratio (BCR)

$$\text{BCR} = \frac{\text{PVB}}{I} \quad \text{_____} (1)$$

$$\text{Net Benefit Cost Ratio (NBCR)} = \frac{PVB - I}{I} = \text{BCR} - 1 \quad (2)$$

Where, PVB - Present value of benefit
I - Initial Investment

$$\text{Present Value (PVB)} = \sum_{t=1}^n \frac{C_t}{(1+r)^t}$$

If Initial Investment = 5,00000/-
and rate of return (Cost of Capital) = 10%
and cash flow by year for 4 yrs are 15,000; 20,000; 20,000; 25,000 then

$$\text{BCR} = \frac{\frac{15,000}{(1.1)^1} + \frac{20,000}{(1.1)^2} + \frac{20,000}{(1.1)^3} + \frac{25,000}{(1.1)^4}}{5,00000/-}$$

$$= \frac{62266.92}{500000} = 0.124 < 1 \text{ reject}$$

BCR > 1 - accept	NBCR > 0
BCR = 1 - indifferent	NBCR = 0
BCR < 1 - Reject	NBCR < 0

1RR : Very simple to understand in the case of one- period project

Example : If you deposit 10,000 and get 10800 after one year then the Rate of Return would be :

$$\text{RR} = \frac{10800 - 10000}{10000} = 0.08 \text{ or } 8\%$$

3. Internal Rate of Return

The 1RR is the discount Rate which makes its NPV = 0;

$$\text{As we know; NPV} = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - \text{Investment}$$

$$\text{As per definition ; OCO Investment} = \sum_{t=1}^n \frac{C_t}{(1+r)^t}$$

Given: Investment = Rs. 100,000; cash flows for four years are 30,000/-; 30,000/-; 40,000/-; 45,000 and discount rate is 15%. Calculate IRR.

IRR is calculated by the process of trial & error by assuming the value of r

i) say r = 15 %

$$\text{Then : } \frac{30000}{1.15} + \frac{30000}{(1.15)^2} + \frac{40000}{(1.15)^3} + \frac{45000}{(1.15)^4} = 100802$$

Which is > 100000/- ; so r > 15%

ii) say r = 16%

$$\text{Then: } \frac{30000}{1.16} + \frac{30000}{(1.16)^2} + \frac{40000}{(1.16)^3} + \frac{45000}{(1.16)^4} = 98641; \text{ By interpolating}$$

these two numbers actual value of r can be identified.

If IRR > cost of capital (discount rate) accept

If IRR < „ reject

Non discounting criteria:

4. Pay Back Period

PBP is the length of time required to recover the initial cash outlay on the project. Say the initial Cash out lay of

the project is 1,000,000/-; The cash in flows are 200,000; 300,000; 300,000 & 400,000 by the end of each four years then PBP is 4 yrs.

If PBP > Target period of project - reject

If PBP < „ „ „ - accept

5. Accounting Rate of Return (ARR)

ARR is also known as Return On Investment (ROI) uses to measure the profitability of an Investment. This is average income after tax, profit by average Investment.

$$ARR = \frac{\text{AverageIncome}}{\text{AverageInvestment}}$$

$$ARR = \left[\frac{\sum_{t=1}^n EBIT_t(1-T) / n}{(I_o + I_n / 2)} \right]$$

A Project will cost Rs.40,000/- ; Its stream of equations before depreciation, interest and tases EBDIT during 1st yr. through 4 years is expected to be 15,000 ; 20,000 ; 25,000 ; 30,000. Assume 50% tax rate and 10,000 depreciation in straight line.

period	1	2	3	4	Average
1.Earning before depreciation interest & taxes (EBDIT)	15000	20000	25000	30000	22500
2. Depreciation	10000	10000	10000	10000	10000
3. Earning before interest (EBIT)	5000	10000	15000	20000	12500
4. Taxes 50%	2500	5000	7500	10000	
5. Earning before interest & after Tax [EBIT (1-T)]	2500	5000	7500	10000	6250
6.Book Value Investment					
Beginning	40000	30000	20000	10000	
Ending	30000	20000	10000		
Average	35000	25000	15000		18750

$$ARR = \frac{\text{AverageIncome}}{\text{AverageInvestment}} = \frac{6250}{18750} \times 100 = 33.33\%$$

ARR > target rate - accept

< „ - reject

Operational & Capital Budget

- Budgeting or profit planning is a detailed action plan during a period of one year or less.
- Firm or organization should achieve its objectives by minimizing the use of resources.
- Financial planning indicates a firm 's growth, Performance, investment and requirement of funds during a given period of time usually 3 or 5 years.

1. Financial Planning

- Growth in sales is an important objective of any firm

- Increase in firm's market share lead to higher growth.
- Firm needs assets for higher growth.
- It requires to increase production capacity for which additional plant and machinery has to be added.
- When internally generated fund of the firm will not be sufficient to meet above mentioned needs, then firm needs to manage external fund i.e. by in using equity or debt or both

The process of estimating the funds requirement of a firm and determining the sources of the fund is known as financial planning.

Financial forecasting is the basis of financial planning and financial forecasting is the estimate of future fund based on past data.

2. **Steps of Financial Planning**

1. **Past Performance :** Analysis of past performance of the firms financial strength weakness
2. **Operating Characteristics :** Analysis of firm' s operating characteristics like product, market, competition, production & marketing policies, control system, operating risk.
3. **Corporate Strategy and Investment Needs:** Determining the firm's investment needs and overall strategy.

4. **Cash flow from operation :** For casting firm's revenue and expenses based on its investment and dividend policies.
5. **Financing Alternatives :** Analysis of financial alternatives and dividing appropriate means of raising fund.
6. **Consequences of financial plans :** Analysis the consequences of its financial plans for the long term health and survival to firm.
7. **Consistency :** Evaluating the consistency of financial policies with each other and with the corporate strategy.

Financial planning is long-term plan of the firm which includes long-term growth and profitability, investment and financing decision.

3. **Profit Planning (Budget)**

Profit planning or Budget is short-term financial plan. It is an action-plan to guide managers in achieving the firm's objectives. A budget is a comprehensive and coordinate plan, expressed in financial term.

The basic elements of budget are:

- It is comprehensive & coordinated plan

- It is expressed in financial term
- It is a plan for the firm's operation and resources
- It is a future plan for specified periods.

A Budget is :

- Integrated plan
- Financial Qualification
- Operations & Resources
- Time Element

The major objectives of Budget are:

- the firm's expectations (goals) in clear and formal terms to avoid confusion and to facilitate their attainability.(Statement of expectation)
- to communicate expectations of the firm to all concerned staff of the firm, so that they can understand, support & implement (communications).
- to provide detail action plan (planning).
- to coordinate the activities and efforts in such a way that the use of resources is maximized. (Coordination)
- to provide a means of measuring, controlling the performance of individuals and units and to supply information on the basis of which the necessary corrective action can be taken (Control).

Preparation of profit plan (Budget)

A comprehensive planning and budgeting system generally includes.

- A sales budget
- A production budget
- A purchasing budget
- A cash budget
- Performa financial statement
- Capital expenditure budget

a) Sales Budget

- The area wise sales of products A & B are as follow:

<u>Sales Area</u>	product % A	B
X	10	50
Y	20	30
Z	70	20

- The selling price of product A is Rs.10, & B is Rs. 20.
- Sales forecast in monthly basis are as follow:

Product	Jan (No)	Feb (No)	March (No)	Total (No)
A	500	1000	1500	3000
B	1000	2000	3000	6000

1. Sales Budget

Month				
Area of Product	Jan	Feb	March	Total(Rs)
<u>Sales Area X</u>				
Product A	500	1000	1500	3000
Product B	<u>10000</u>	<u>20000</u>	<u>30000</u>	<u>60000</u>
Total of Area :	10500	30000	31500	63000

<u>Sales Area Y</u>				
Product A	1000	2000	3000	6000
Product B	<u>6000</u>	<u>12000</u>	<u>18000</u>	<u>36000</u>
Total of Area :	7000	14000	21000	42000

<u>Sales Area Y</u>				
Product A	3500	7000	10500	21000
Product B	<u>4000</u>	<u>8000</u>	<u>12000</u>	<u>24000</u>
Total of Area :	7500	15000	22500	45000

Total for all areas 25000 59000 75000 159000

2. Production Budget

Budgeted Production (units) = (Sales estimate + Desired /
Expected closing stock) - opening stock

	Jan	Feb	March
I. Estimate sales of A:	500 units	1000	15000
Desired closing stock	<u>200</u>	<u>500</u>	<u>700</u>
	Total: 700	1500	2200
	(-)Opening stock: <u>400</u>	<u>500</u>	<u>800</u>
Unit A to be produced :300		1000	1400

II. Estimate sales of B:	1000	2000	3000
Desired closing stock	<u>500</u>	<u>1000</u>	<u>1500</u>
	Total: 1500	3000	4500
	(-)Opening stock: <u>500</u>	<u>1000</u>	<u>1500</u>
Unit B to be produced : 1000		2000	3000

3. Purchasing Budget

In the production of each product A and B needs one common material. Say to produce A need 2 units of materials and to produce B 4 units of materials. The cost of one unit of materials is Rs 2/- Labour cost is Rs5/- per hour in which one can produce 1 unit of materials.

Then Purchasing Budget is as follow:

Jan Feb March

a)	Material needed to Produce A (1 unit x 2 unit of materials)	600	2000	2800
b)	Materials needed to produce B (1 unit x 4 unit of materials)	4000	8000	12000
	Total production needed	4600	10000	14800
	(+) Desired closing balance	<u>2000</u>	<u>5000</u>	<u>8000</u>
		6600	15000	22800
	(-) Opening balance	<u>3000</u>	<u>8000</u>	<u>10000</u>
	Purchase (units)	3600	7000	12800
	Cost of purchase @ Rs.2/- per unit	7200	14000	25600

4. Labour Budget

	Jan	Feb	March
Units of A to be produced	3000	1000	1400
„ „ B „ „ „	<u>1000</u>	<u>2000</u>	<u>3000</u>
Total Units	<u>4000</u>	<u>3000</u>	<u>4400</u>
Total hours at 1 hr per unit	4000	3000	4400
Total labour cost @ Rs.5/- per hr (Rs)	20000	15000	22000

4. Cash Budget

	Jan	Feb	March
Description			
a) Opening cash balance			
b) Add cash collection From sales + debtor collection			
c) Less cash disbursement, Raw materials purchase			
d) Total cash disbursement			
e) Cash surplus or deficit			

- f) Min-cash balance (ending)
- g) Borrowing (repayment)
- h) Interest
- i) Cash balance ending

5. Performa Income Statement

	Rs	Rs
Sales Revenue		*
Cost of goods sold		
Product A	*	
Product B	<u>*</u>	
	**	
Gross Profit		(*-**)
Operating expenses		
Salaries	-	
Rent	-	
Sales Commission	-	
Interest	-	
Depreciation	-	
Net Profit	<u>X</u>	(*-**)-X

5. Performa balance Sheet

Capital & Liabilities:

Creditors	-
Loan	-
Interest payable	-
Share Capital	-
Profit	<u>-</u>

£

Assets:

Cash

Debtors

Stock

Raw Materials

- Product A

- Product B

Plant & machinery

Less depreciation

£

Advantage of Budgeting

- Forced planning – The budgeting process forces mgmt to plan
- Coordinated operations
- Performance evaluation and control
- Effective communication
- Optimum utilization
- Productivity improvement

Types of Budgets:

- All enterprises make plans.
- Some in systematic and formal way, while some in an informal manner.

- Large and medium firms have comprehensive system of budgeting – Prepares budgets for all their important operations.
- A master budget with a complete package of the components budget is prepared in comprehensive budgeting.
- Three important components of master budget are:
 - 1) Operating budgets.
 - 2) Financial budget
 - 3) Capital budget.

1) Operating Budgets

Planning of the activities or operations such as production, sales and purchase is operating budget. Operating budget is composed of two parts: a program/Activity Budget and Responsibility budget. These are the two different ways of working at the operations of the enterprises but arriving at the same result.

1.a) Program or Activity budget:

This specifies the operations or function to be performed during the year, in which budget is prepared and past financial statements indicates the direction of change in the financial position and performance of the enterprises. Manager takes it as a guideline for future budgeting.

1.b) Responsibility budget:

Responsibility budget specifies plans in terms of individual responsibilities. The focus is on individuals. The basic purpose of this budget is to control by comparing the actual performance of a responsible individual with the expected performance. Program budget is planning process while responsibility budget is control devices. Program budget need not to tailored to the organizational structure, of the enterprises, but responsibility budget must be. Therefore, the plan (program budget) must be converted into the control (Responsibility budge).

There are two ways in which the operating budget may be prepared. i) Periodic budgeting.
ii) Continuous budgeting .

In periodic budgeting comprehensive revision is not provided while in continuous budgeting revision of budget for changing condition is provided.

In case of the stable firms, which can forecast with reasonable precision, periodic budget can be used whereas in case of those firms, which operate in the condition of uncertainties, Continuous Budgeting is used.

2. **Financial Budget:**

The expected cash inflow and cash outflow, financial position and operating results are the basic concern of financial budget. The important component of the financial budget is cash budget and Performa Financial Statements.

2.1. **Cash Budget**

This is the most important component of financial budget. A good management always keeps its cash balance at optimum level: too little cash endangers the liquidity of the company, and much cash tends to impair profitability. The major objectives of cash budget is to plan cash balance in such a way that the company always maintains sufficient cash balance to meet its needs and uses the idle cash in the most profitable manner.

2.2 **Performa Financial Statements:**

Performa Financial Statements in the form of Balance sheet and income statements show the end result of the budgeted operations. Performa Financial Statement provides information about future assets, liabilities and revenue and expenses items. The analysis of the present and past financial statements indicate the direction of change in the financial position and performance of the enterprises. Manager takes as guide line for future budgeting

3. **Capital Budgets.**

Capital budgets involve the planning to acquire worthwhile projects, together with the timing of the

estimated cost and cost flows of each project. Such project requires large amount of fund and have longterm implication. It is very difficult to prepare capital Budget.]

The capital budget is generally prepared separately from operating budget. Separate committee within enterprises is formed to prepare capital budgets.

Fixed and Flexible Budget

- 1) Fixed Budget is also known as static budget or master budget.
- 2) Flexible Budget, which is also known as variable budget is a budget that adjusts for changes in sales volume and other cost- driver activities.

Budget formula per unit	Flexible Budget formula	Flexible budget for various level of sales / product		
Units		7000	8000	9000
Sales	Rs.30	210000	240000	270000
Variable cost expenses				
- Variable manufactur cost	Rs. 20	140000	160000	180000
- Shipping expenses	Rs.0.8	5600	6400	7200
- Administrative	Rs. 0.2	1400	1600	1800
	21 .0	147000	168000	189000
Contribution margin	9.0	63000	72000	81000
Budget formula per month				
Fixed Cost				
Fixed manufacturing costs	36000	36000	36000	36000
Fixed selling & administrative cost	34000	34000	34000	34000
	70000	70000	70000	70000
Operating Income		(9000)	2000	11000

Flexible Budgets

Say the unit cost in sales is fixed and varyy the quantity of product

Audit

Accounting is more an art than a science. It is based on a set of principles on which there is general agreement, not on rules that can be “proved”. An accounting system is a formal mechanism for gathering, organizing and communicating information about an organization’s activities. Each and every organization adopts generally accepted accounting principles (GAAP). GAAP includes broad concepts or guidelines and detailed practices, including all conventions, rules, and procedures that together make up accepted accounting practice at a given time. However internal accounting reports need not be restricted by GAAP. But in each country, the government has made its own system of accounting. And based on the nature of the organization, they are made responsible to adopt the particular accounting principles.

Audit is a controlling mechanism used in accounting system. In each country, the government has its own independent body, which is responsible to control the account of all organizations inside the country. The office of Auditors is the central independent body in our country for this purpose.

Audit is an examination or in depth inspection of financial statements and companies’ records that is made in accordance with generally accepted auditing standards. It culminates with the accountant’s testimony that management’s financial statements are in conformity with general accepted accounting principles. Mostly two different types of audit are in practice. They are:

4. Internal Audit
5. External Audit

- o Examine the significance of environmental implications;
- o Recommend preventive and corrective mitigating measures;
- o Inform decision makers and concerned parties of environmental implications and
- o Advise whether development should go ahead.

Chapter-6

IMPACT ANALYSIS

Environmental impact Analysis (EIA)

DEFINITION

- EIA has been defined in slightly different ways by many authors and institutions both nationally and internally.
- One of the most complete and clear definitions, given by Munn (1979), refers to the need "to identify and predict the impact on the environment and in man's health".

Usefulness of EIA

- EIA is considered as a project management tool for collecting and analyzing information on environmental effects of projects to aid planning and implementation of decisions. It is used to;
 - o Identify potential environmental impacts:

Purpose of EIA

- EIA provides a systematic examination on environmental implications of proposed actions and alternatives to assist decision making.
- The cost benefit and trade off analysis between the project implementation and associated environmental cost facilitate the decision makers in making decisions which are more likely to result in sustainable projects.

Project Types

- EIA generally applies to projects, which require construction (e.g. infrastructures or manufacturing projects)
- There are two types of projects:
 - o Point and
 - o Band
- Points refer to power station, bridges
- Band refer to roads, transmission lines

Impacts and Effects

- In many cases, the terms "Impact" and "effect" are used synonymously.

- However, the term “Impact” is an outcome of two preceding events.
- Take an example:
 - An example of air pollution deposited on the leaves of crops which shows down the photosynthetic process (change) and reduces crop yield (effect), affecting the farmer economically (adverse impact)
 - If the deposition of air pollution in marsh land reduces the oxygen content in the water (change), which prevents respiratory actively mosquito larvae (effect), it eventually kills them (beneficial impact).

The EIA Process

- In all national EIA systems, there is a basic sequence of activities, which is followed once a project has been identified.
- The main activities of EIA process with their brief comments are explained below in their logical sequences :
 1. **Project Screening:** Determines whether the project in question, needs an EIA.
 2. **Scooping:** This process identifies all significant Impacts. It form the basis for the terms of reference.
 3. **Project description and consideration of alternatives:** It seeks to describe all reasonable alternatives, including the preferred and "no action" options (project location, scale, process layout and operating conditions.

4. **Description of environmental baseline:** It establishes the current state of environment and any trends.
5. **Prediction of impacts:** The impacts are predicted as far as possible, quantitatively in terms of characteristics such as magnitude, extent and duration.
6. **Evaluation of impacts:** The significance or importance of the predicted impacts is determined.
7. **Mitigation measures:** It measures to avoid, reduce and minimize adverse impacts and to enhance beneficial impacts are designed.
8. **Stakeholder involvement:** It occurs at various stages in the EIA process to ensure quality, comprehensiveness and effectiveness of EIA and to ensure that stakeholder views are adequately addressed in the decision-making process.
9. **Monitoring and auditing measures:** Impacts which should be monitored are identified and any auditing requirements are specified.
10. **EIA Report:** It contains the information obtained, analyzed, interpreted and compiled in a report form. The report should contain a non-technical summary, methods used, results interpretation and conclusion.
11. **Review:** EIA report submitted for review in order to access whether or not all the possible issues have been adequately addressed and to facilitate the decision making process.
12. **Decision-making:** With the help of information and conclusions give in EIA reports and the outcome of

reviews, the decision makers determine whether or not the project should go ahead.

Screening the project

- Many projects are considered by the government for implementation every year.
- EIA needs only be applied for those actions which may significantly affect the environment.
- It is therefore important to establish mechanisms for identifying projects requiring EIA; this process of selection is called a "screening the project".

Objectives of screening the project

- Screening of development proposal during the early stages of project planning accomplishes the following :
 - Saves money
 - Saves time (i.e. avoids unnecessary delays)
 - Immediately identifies the major environmental impacts that are likely and
 - Establishes a conception that an EIA study needs to be conducted.
-

Screening Procedure in the Nepal National EIA Guidelines

- The National EIA Guidelines 1993 lists of project, thresholds and sensitive area as criteria to assist screening.
- All projects are divided, generally into three categories:
 - Projects requiring Initial Environmental Examination (IEE)
 - Projects requiring EIA and

- Projects for which it is not clear whether an EIA or IEE is needed.

1. Projects requiring IEE

- The guidelines contain three schedules which contain separate list of different project types.
- When a project is proposed, it is necessary to check whether the project is listed or not.
- If it is listed in schedule 1, it requires an Initial Environmental Evaluation (IEE)

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Schedule 1

- The projects listed in schedule 1 are those which are likely to have limited number of significant impacts, which can be easily predicted and evaluated and for which, mitigation measures may be prescribed easily.
- The IEE is used to confirm whether this is, indeed, requires the consideration of EIA.

Schedule 2

- The projects listed in schedule 2 are those projects, for which, EIA is required.

Schedule 3

- Schedule 3 contains a list of environmentally sensitive areas and any project, which is likely to **impact** such an area, must be subject to an EIA.
- All other projects must be examined on a case by case, basis to decide whether or not IEE or EIA required.
- If there is an uncertainty, then an IEE should be conducted.

- The results of the IEE will determine whether or not an EIA is required.

Initial Environmental Examination (IEE)

- Projects for which requirement of an EIA could not be easily ascertained, is subject to an IEE
- An IEE is carried out to determine if significant adverse environmental effects are likely to occur which requires detailed study before mitigation measures can be determined.
- Therefore, an IEE requires :
 - Adequate in - depth analysis than screening.
 - Adequate technical input and advice from environmental specialists and experts and
 - Adequate amount of more resources and time
- If IEE provides solutions for potential environmental problems and the application for screening was not able to identify problems properly, then there is no need for conducting a full scale EIA.

How IEE should be conducted?

- In order to carry out an IEE, it is necessary to understand the following components of the project activities and the surrounding environment :
 - Project activities to be implemented.
 - Setting of project, resources, demands and the waste produced.
 - Policies, regulation and guidelines to be known of IEE and

- Resources and environment are likely to be impacted.

- This information can easily be made available in the project proposal and some experts may visit the project area as an inventory survey which may be called a preliminary analysis.

Social Impact Analysis

DEFINITION

- The development activities of the development projects usually change the social culture and social way of life of the indigenous ethnic group anywhere in the project areas.
- These changes effect the quality of life, social organization and structures, including language, ritual and other general life, relationship between generation and value system. The effects of these factors impact the large social systems.
- In basic terms, there may be seen alterations in the ways, people live, work, play and their needs, values, beliefs and norms.
- The study of this impact of the social systems is called Social Impact Analysis.
- Generally social impact analysis covers the following areas:

- Demographic impacts: Such as displacement and relocation effects and changes in population make up.
- Socio- economic impact - including income and income multiplier effects, employment rate and patterns, prices of local goods and services and taxation effects.
- Cultural impacts - traditional patterns of life and work, family structures and authority, religious and tribal factors, archaeological features, social networks and community cohesion.
- Institutional impacts - including demands on the government and social service, NGOs in areas such as housing, schools, criminal justice, health, welfare and recreation.
- Gender impacts - the implications of development projects on the roles of women in society income generating, opportunities, access to resources, employment opportunities and equity.

Relationship between social impact and EIA

- The close relationship between social and environmental systems makes it imperative that social impacts are identified, predicted and evaluate in conjunction with biophysical impacts.
- For example :
 - Eradication of malaria from Nepal's Terai region by the application of DDT in the 1960 eliminated the anopheline mosquito - a vector species of malaria.

- People from different parts of Nepal moved into the area and settled in number of new villages.
- These people exploited the newly available natural resources in an unsustainable way by significantly reducing forest and wildlife population.
- This illustrates an environmental change giving rise to social problems.

Different ways/ steps / aspects to be considered while studying social impact analysis

- Social impacts are very difficult to identify and predict and degree of certainly because of the variety and complexity of social structures and systems.
- However, demographic and cultural resource impacts may be more objective, so it becomes easier to identify and predict them.

1st step/aspect

- The first step in social impact analysis is to identify social groups which make up local communities.
- Relevant characteristics which may be used to identify such groups include:
 - Ethnic/tribal
 - Occupational
 - Socio-economic status and
 - Age and gender

2nd step/aspect

- Another aspect of social impact analysis is the consideration EIA for a project which is being planned for the implementation in an ecologically sensitive area, from which the local people are deriving their livelihood.

- People utilizing resources in such an area can be broadly categorized into three resource and group:
 - Those who residents from generation to generation, stable, low - energy and sustained yield production systems, opened by local people, based on knowledge transmitted through generations, well adapted and compatible with the environment.
 - New settlers who have comparatively less knowledge or the resource base of the area and of sustainable resource- use practices and usually devastate the area through excessive use of biophysical resources.
 - Non- residents people, who often visit the area for exploitation of biophysical resources and are potentially more dangerous than either of the above type.

3rd step/aspect

- It is always advisable to avoid involuntary resettlement, mostly in case where vulnerable groups of people are involved and
- In case where projects require land acquisition from indigenous territories, the people affected should be compensate adequately so that their standard of living is improved or at the least, is at similar level.

Economic Impact Analysis

- The focus in economic impact analysis is the estimation of the change in economic variables caused by:
 - Project construction and operation
 - Work force requirement and the income earned by workers
 - Raw materials and other inputs for the project and
 - Capital investment

Project Construction & Operation

- It is essential to estimate the size of the labor force, skilled manpower requirement and their duration of their involvement. The requirement of manpower varies at different stages of project implementation.

Work force requirement and the income earned by workers

- A thorough analysis of the labor force and the local economy requires information on:
 - The categories of labor available
 - The categories of labor that are highly demanded and employed, not employed and partly employed.
 - Estimation of unemployment labor
 - Proportion of females looking for employment and
 - The number and type of employment likely to be generated by project implementation.
- These data can be manipulated for analyzing and predicting economic impacts.
- The money that comes into the area in the form of wages is the initial income injection into the local economy.

- Some part of such extra money will be spent on buying goods and services helping to improve the economy of those who sell goods and services.
- In this way, a flow of money in the project area is being maintained with certain changes in the economy at each stage.
- Thus, the value of the economic multiplier will be high. In some cases, the income earned by labor will be remitted outside the project area to their families; in such cases, the value of multiplier would be low.
- This is the reason why the emphasis on the employment of local people is desirable rather than employing people from outside the project area.

Raw materials and other inputs for the project

- Social impacts are the outcomes of economic impacts and this is particularly true for the project in which migration of workers from outside is dominant.
- This does not always happen; however it happens when the labor market in the local area is insufficient.
- In-migrant labor forces can take up any type of employment and create social problems.
- The impacts created in the operational stage are more far reaching than in the construction period.
- The reason is that most workers during the construction tend to be unmarried and stay on site for a short period of time.
- However, workers in the operational period tend to remain for longer periods of time and bring their dependents with them; as a result, the impacts on the local service provision

such as schools, hospitals, sewage treatment will be more comprehensive and long lasting.

Capital Investment

- In developing countries, with development activities going on, large numbers of people are attracted in search of employment.
- Such a massive aggregation of people can place significant additional strains on the local infrastructure environment and local government resources.

Questions on Project Management

1. Define Project and its major components. What are the different characteristics of the project? How are project objectives and goals set?
2. Discuss the different phases of the Project Life Cycle.
3. Define Feasibility study. How is a Project Proposal prepared?
4. Discuss the Project Environment.
5. What are project-identifying tasks? Explain Project Appraisal.
6. What is project planning? Discuss project-planning function.
7. What is a Bar Chart? Discuss different types of bar chart. Explain its advantages and discrepancies.

8. Define Goal Oriented Project Planning (ZOPP). Discuss different phases of ZOPP.
9. Define Network models CPM/PERT. Discuss basic concept of CPM/PERT. What are different steps involved in PERT?
10. Discuss project scheduling with limited resources. Explain manpower scheduling.
11. Define plan of operation and its different form.
12. Discuss Monitoring and Evaluation. What are different methods and techniques in Monitoring and Evaluation?
13. What is a system of control? What are the purposes of quality control system?
14. Discuss project control cycle and feedback control system. What are the different techniques involved in Project control?
15. Define project management information system (PMIS), its purpose and advantages.
16. Define capital planning and budgeting. Why investment decision required special attention? Discuss different types and phases of capital budgeting.
17. Define capital planning procedure and features and importance of capital budgeting. Discuss investment evaluation criteria.
18. Discuss investment criteria. What are the two major categories of investment criteria? Illustrate with example.
19. What is profit planning (Budget)? Discuss different types of budget.
20. Define three major component of master budget. Illustrate with example how sales budget is prepared.
21. Discuss different steps involved in the preparation of the budget in an enterprise.
22. Define Environmental Impact Analysis. Discuss social and economic impact analysis.
23. Draw network diagram from the following given data and calculate EST, EFT, LST, LFT, TF, FF.
24. Write short notes on:
 - i) WBS
 - ii) Project control cycle
 - iii) Profit planning
 - iv) Capital budgeting
 - v) Fixed and flexible budget
 - vi) Discounting criteria
 - vii) Non-Discounting Criteria
 - viii) Material Scheduling
 - ix) Operating Budget
 - x) Project Appraisal
 - xi) Auditing